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SURVEY PROCEDURE FOR FUSIFORM RUST

Reserve
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A SURVEY PROCEDURE FOR FUSIFORM RUST

A fusiform rust survey method has been developed 1) to determine the intensity of infection in established plantations so that the land owner can make a decision as to future management and 2) to define rust hazard zones and where it is safe to establish new plantations. The method is one that is simple, rapid, and easily applied by individuals having a minimum of training in the procedure. This sampling method, as developed by Yandle and Roth ^{1/}, can be used on large and small plantations and natural stands. It was shown that in surveying individual plantations, a three row sample would give adequate precision. It is desirable that individual, industrial, federal and state land managers use this survey procedure to conduct the needed surveys.

SAMPLING METHOD AND PROCEDURES

When sampling a plantation, three rows are randomly selected for examination (Figure 1). This random selection is made by assignment of a number to each plantation row and a subsequent selection of three numbers by draw or use of a table of random numbers. Many times the rows near the corners of plantations are shorter and contain only a few trees. When one of these short rows is selected as a sample row, it is suggested that such a short row be combined with adjacent rows to create a row of approximately average length.

The same type survey is applicable to natural stands. When making this type survey it is necessary to measure the width of the stand. Then, establish imaginary transect lines every 10 feet, assign a number to each and select transects as explained above for rows. In natural stands, for each preselected transect, healthy and diseased trees would be tallied three feet to the right and left of the transect line.

For plantations or natural stands that are 500 acres or more in size, it is desirable to divide the area into two or more blocks and sample three rows in each block. The dividing line should be some natural boundary such as a ridge top, creek, road, trail or other natural feature (Figure 2).

All trees in each of these preselected rows are examined and information recorded as to whether each tree is 1) healthy or 2) diseased or dead

^{1/}Yandle, D. O. and E. R. Roth 1970. Ratio Estimation of Fusiform Rust Incidence in southern pine plantations — submitted to Forest Science.

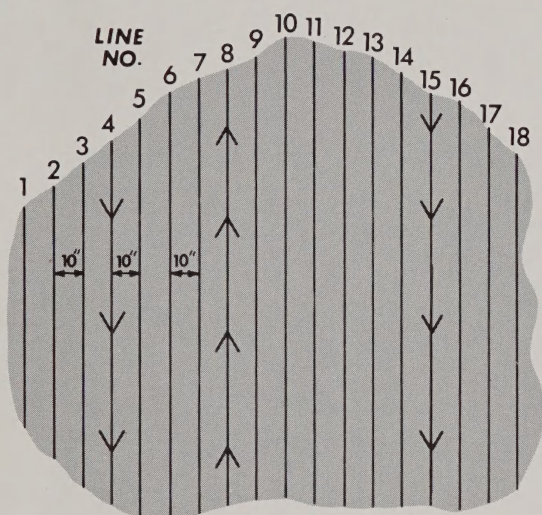
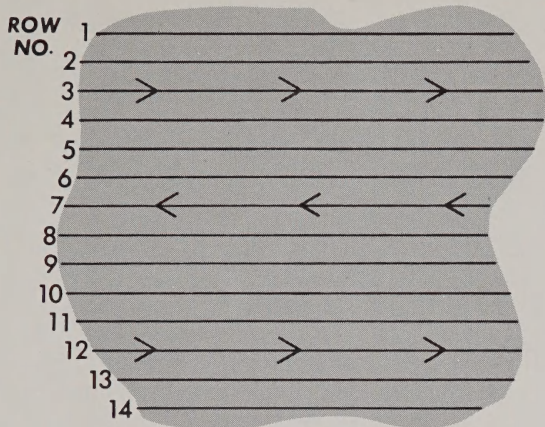


Figure 1: Sampling methods for small plantations and natural stands.

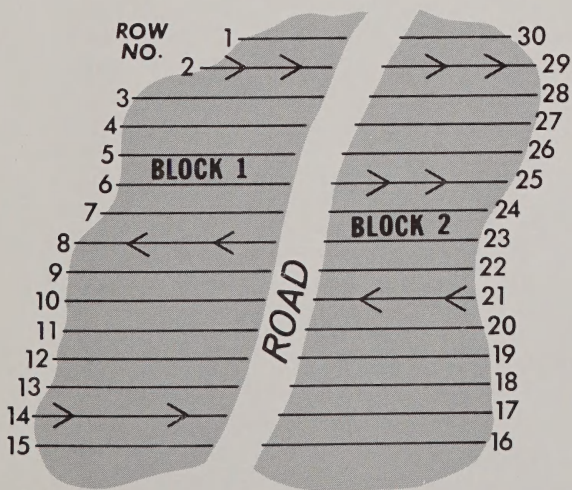


Figure 2: Sampling methods for large plantations and natural stands.

from fusiform rust. Figure 3 gives a sample plot data work sheet. The number of diseased trees divided by the total number of trees times 100 will give the percentage of diseased trees.

For our purpose, a tree is considered diseased if it has either a stem or branch canker.

LARGE SCALE SURVEYS

This method will give an acceptable estimate of the percentage of infection for an individual plantation or natural stand and can be adapted to large scale county or state-wide surveys. This can be accomplished by requiring a sampling of a pre-determined number of plantations or natural stands in that particular Ranger District, National Forest, county or state. The number and species of plantations or natural stands to be sampled would depend on their respective number in the sample area. There should be no less than ten sampled. The sample distribution between slash and loblolly areas should be in the same ratio as they occur in the area, and should be well distributed over each National Forest, county or state. This is necessary so that a map showing the range of variation of infection can be prepared.

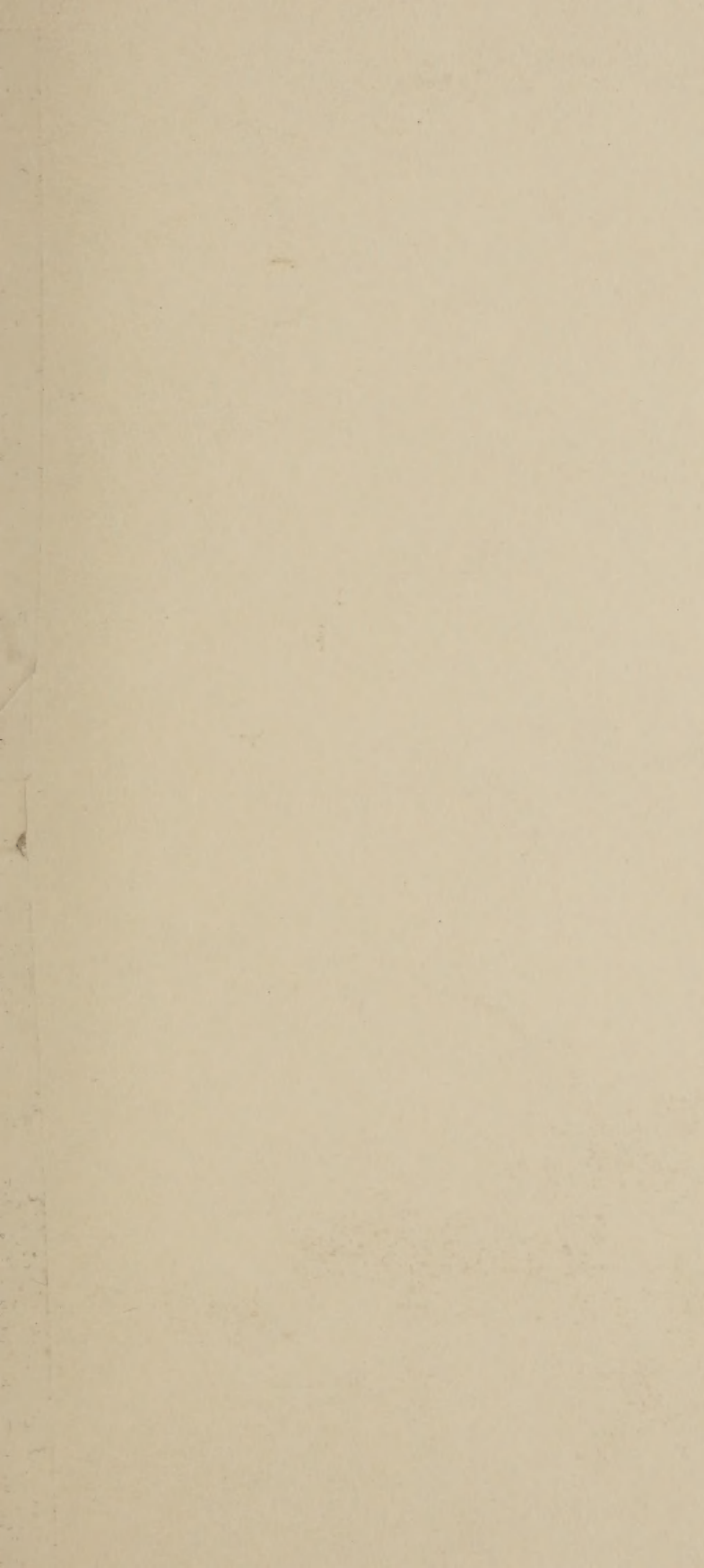
Such large scale surveys can be easily analyzed using automatic data processing equipment. The Division of Forest Pest Control, U.S. Forest Service should be contacted for assistance if a large scale survey is desired.

DATA ANALYSIS

An example of the analysis of data for each plantation or natural stand would be calculated as follows. If the survey showed 400 healthy trees and 250 fusiform infected trees the following calculations would be made for each plantation or natural stand.

$$\text{Percent infection} = \frac{\text{Fusiform infected trees}}{\text{Infected trees} + \text{Healthy trees}} \times 100$$

$$\frac{250}{250 + 400} \times 100 = \frac{250}{650} \times 100 = 38.5\% \text{ infection}$$



If the plantation had 1000 trees per acre and 38.5 percent of the trees were infected with fusiform rust, 615 healthy trees per acre would be left.

1000 — Number of trees per acre

385 — Infected trees

615 — Number of healthy trees per acre

For large scale surveys, compilation of individual representative plantations and natural stands could be made and combined into a total overall analysis of fusiform rust infection, or they could be considered individually if percentage of infection varied between plantations.

It has been found that pine stands tend to have a greater amount of infection as they get older, at least up to about 15 years of age. Plantations to be sampled when working with large areas should preferably be in the same age group, say 8 to 11 years, so that results would be uniform as to number of rust years to which each plantation had been subjected. For the small landowner, an individual plantation of any age may be sampled. Plantations with 1 to 30 percent infection would be considered lightly infected, 31 to 70 percent moderately infected and over 70 percent severely infected. Diseased trees in stands in the lightly and moderately infected category should be thinned

STATE _____ COUNTY _____ DATE _____

PLANTATION NUMBER _____ ROW NUMBER _____

1		35		69	
2		36		70	
3		37		71	
4		38		72	
5		39		73	
6		40		74	
7		41		75	
8		42		76	
9		43		77	
10		44		78	
11		45		79	
12		46		80	
13		47		81	
14		48		82	
15		49		83	
16		50		84	
17		51		85	
18		52		86	
19		53		87	
20		54		88	
21		55		89	
22		56		90	
23		57		91	
24		58		92	
25		59		93	
26		60		94	
27		61		95	
28		62		96	
29		63		97	
30		64		98	
31		65		99	
32		66		100	
33		67			
34		68			

Figure 3: Plot data work sheet — Fusiform Rust Survey.



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Figure 4: Fusiform rust infected plantation.

out at the earliest possible time in keeping with good management practices. If a stand is found to be in the severely infected category, the land manager should consider carefully the future management of the area. Those stands which are severely infected may be clear cut and planted to less susceptible species or it may be decided to maintain the healthy trees to maturity. A minimum stocking for a commercial stand is considered to be 40 square feet of basal area per acre. This determination can be made by consulting a qualified forester.

Surveys for fusiform rust can be conducted at any time of year as it is relatively easy to distinguish the swellings caused by the rust fungus. While it may be easier to see the swellings when they are covered with orange-yellow aeciospores, many of the cankers do not fruit every year, so fruiting cannot be depended upon to discover all the cankers. Also, the fruiting season only lasts about six weeks in the spring.

If additional information or assistance is needed to conduct a fusiform rust survey contact your nearest

- State Forester or local unit Forester
- Local District Ranger, U.S. Forest Service
- Forest Pest Control office:

P.O. Box 5895

Asheville, North Carolina 28803

or

2500 Shreveport Highway
Pineville, Louisiana 71360

